Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2582-2845.7921

ISSN: 2582 – 2845

Ind. J. Pure App. Biosci. (2020) *8*(1), 386-389

Research Article

Indian Journal of Pure & Applied Biosciences

Peer-Reviewed, Refereed, Open Access Journal

Effect of Plant Growth Hormones on Yield and Biochemical Constitute in Kalmegh (*Andrographis peniculata* Burn F. Ex)

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Received: 12.01.2020 | Revised: 17.02.2020 | Accepted: 25.02.2020

ABSTRACT

This study was conducted at A field experiment was carried out in the research farm of RAK College of Agriculture, Sehore (Madhya Pradesh) during Kharif 2016-17). A field experiment consisting of Plant Growth Hormones Cycocel (100, 150 and 200 ppm), GA_3 (100, 150 and 200 ppm) and NAA(100 and 150 ppm) and water spray as control to study the effect of plant growth Hormones on yield viz Number of seed/pods number of pods/plant, number of seed/pods,1000 seed weight, pod weight (g/plant), seed yield (g/plant), seed yield (Kg/ha), herbage yield (g/plant), herbage yield (q/ha) and biochemical constitute viz nitrogen %. protein %, fat %, and fiber % in root and Ash% of plant with Leaf andrographolide content of Kalmegh (Andrographis peniculata Burn F. Ex). at harvesting. Significantly higher Seed yield (531.17 Kg/ha) and herbage yield (193.23 Q/ha) was observed by treatment GA_3 100 ppm at harvesting time as compare to treatment GA_3 200 ppm (394.18 Kg/ha) and Cycocel 200 ppm (162.03 Q/ha) respectively. Similarly higher content of protein % (0.77) was recorded in root of plant applied with GA_3 100 ppm at maturity as compare to applied with Cycocel 100 ppm (0.61%). The higher andrographolide content in leaf applied with GA_3 @ 100 ppm (2.97 % w/w) was very effective and recorded maximum percentage of leaf andrographolide respectively.

Keywords: *Andrographolide, Cycocel, GA_3 NAA spray, ppm, Pod weight, Harbage yield nitrogen %, Protein % fat %, HPLC*

INTRODUCTION

Kalmegh (*Andrographis paniculata* Burn F. Ex) is a large genus of herbs and shrubs. In the family of Acanthaceae. Distribution mostly in the tropical and moist region. It comprises of 19 species the plant is found in India and Shrilanka. It is indigenous to India. In India it is grown in Assam, Bihar, Karnataka, Kerla Madhya Pradesh, Andhra Pradesh and West Bengal.

Cite this article: Raidas, D.K. , Upadhayaya, S.D., & Sharma, A. (2020). Effect of Plant Growth Hormones on Yield and Biochemical Constitute in Kalmegh (*Andrographis peniculata* Burn F. Ex), *Ind. J. Pure App. Biosci. 8*(1), 386-389. doi: http://dx.doi.org/10.18782/2582-2845.7921

Kalmegh also known as "King bitter" is one among the prioritized medicinal plant in India and this herbs is being used mainly useful in treating fever, treating liver related diseases, jaundice, diabetes. Snake bites. The leaf and the whole herb contain the medicinal important. Growth of a plant is greatly affected by much environmental condition which affected the physiology of plant. The leaves of Kalmegh contain maximum active principle like Andrographolide, homo-andrographolide andrographesterol and andrographone. Andrographolide the major constituent in leaves which is bitter sub-stance (Gorter, 1911). The average Andrographolide contain varied from 12.44 to 33.52 mg/g in dried leaves (Prathanturarug, 2007). The recognition of such growth control mechanism has introduced the possibility of modifying growth and development of plant by manipulating hormone level in different organs and various stages in the life cycle. Plant growth regulators are organic compound, other than nutrients, that modify plant physiology processes. To specific PGRs are used to modify crop growth rate and growth pattern during the various stages of development, from germination through harvest. The final test, however is that harvested yields must be increase or medicinal quality enhanced in order for growth hormones to be profitable. The synthetic growth regulators chemicals are being extremely important and valuable for manipulating the yield and biochemical constitute of Kalmegh (*Andrographis paniculata* Burn F. Ex).

MATERIALS AND METHODS

This study was conducted at A field experiment was carried out in the research farm of RAK College of Agriculture, Sehore (Madhya Pradesh) during *Kharif* 2016-17). There were eight treatments Cycocyl (100, 150 and 200 ppm), GA_3 (100, 150 and 200 ppm) and NAA (100 and 150 ppm) and the water being the control. This study was done on the base of randomized complete block design. The treatment was replicated 3 times. The plant growth regulators were sprayed in three stages viz seedling stage, vegetative stages and reproductive stage. The local kalmegh variety seeds were sown in main field at 30 x 15 cm spacing. The whole plot was divided into 3 block each representing the replication. Each block was then divided into unit plot of 2 x 3 m size. The experiment plot fertilized with urea, single super phosphate and murate of potash @ of NPK 75 kg, 75 kg and 50 kg ha^{-1} respectively. All the operations done regularly during growing season. The yield parameter and biochemical observations were recorded on five randomly selected plants from every treatment at the time of harvesting. The collected data includes number of pods/plant, number of seed/pods,1000 seed weight, pod weight (g/plant), seed yield (g/plant), seed yield (Kg/ha), herbage yield (Q/plant) and biochemical constitute viz nitrogen %. protein %,fat %, fiber % and ash% in root of plant and leaf andrographolide content of Kalmegh (*Andrographis peniculata* Burn F. Ex). The Nitrogen content of root was estimated at maturity stage by microkjeldhal method as by (AOAC,1980). The fat content in the root sample will be estimated by sox let's extraction methods as described in (AOAC, 1985). The total crude fibre content in root sample was estimated by method as described by (Sadasivam & Manickam, 1992). The ash content of plant in the sample will be estimated according to AOAC, Methods (1985). And estimation of leaf Andrographolide by HPTLC method. Finally mean data of the all characters were computed for statistical analysis as per standard procedure given by (Panse & Sukhtme, 1989).

RESULTS AND DISCUSSIONS

1. Yield parameter: The data on yield parameter is represented in the table -1. The effect of different concentration of plant growth hormones was significantly on number of seed/pods except on number of pods/plant. The maximum number of seed/pod was recorded with treated Cycocel @150ppm (10.22) and lowest was recorded with treated Cycocel 200 ppm (8.11) as compare to control (7.88). The maximum No. of pods/plant was recorded with treated GA_3

@ 100 ppm (120.86) as compare to control (107.44). Closely followed by GA_3 @ 200 ppm (118.71) and NAA @ 100 ppm (116.30) which were at par. The effect of different concentration of plant growth hormones was significantly on 1000 seed weight(g), pod weight (g/plant) and Seed yield (Kg/ha). The maximum test weight recorded with treated GA_3 @150ppm (2.88)as compare to control (2.13). Closely followed by Cycocel@ 100 ppm (2.47) and GA_3 @100 ppm (2.66) which were at par. The maximum pod weight (g/plant) and seed yield (g/plant) obtained by treated with GA_3 @ 200 ppm (3.50) as compare to control (1.99) and treated with Cycocel @ 200 ppm (58.95). as compare to control (42.43) respectively. The maximum seed yield (531.17 Kg/ha) was obtained by spraying GA_3 @ 100 ppm and herbage yield (39.60 g/plant) spraying with GA_3 @ 150 ppm and maximum herbage yield (193.23 Q/ha) was obtained by spraying with GA_3 @ 100 ppm. Similar results have been (*Andrographis paniculata* Nees.) recorded by Channakesava *et al.* (2007) and lowest seed yield (513.47 Kg/ha) treated with Cycocel @ 100 ppm and lowest herbage yield (27.78 g/plant) treated with Cycocel @ 200 ppm and lowest Herbage yield (162.03q/ha) was recorded as compare to control (159.30) respectively. Similarly results have been (*Andrographis paniculata* Nees.) recorded by Sowmya Kumari and Umesha K (2018).

2. Biochemical constitute: The data on biochemical constitute is represented in the table -1.The effect of different concentration of plant growth hormones was significantly on nitrogen%, protein %, fat %, and fiber % in root of Kalmegh (*Andrographis paniculata* Nees.) at maturity except ash%. Significantly maximum nitrogen (0.77%) and protein (4.36%), were recorded in the spray with GA_3 @ 100 ppm and minimum nitrogen (0.61%) treated with Cycocel @ 100 ppm. and (3.55%) treated with GA_3 @ 200 ppm. The maximum fat (1.71%) were recorded treated with Cycocel @ 100 ppm and minimum fat (1.05%) spray with NAA@ 100 the maximum fiber (1.12 %) treated with Cycocel @ 100 ppm and minimum (0.59%) treated with Cycocel @150 ppm were recorded as compare to control (0.54%) respectively. The maximum ash (0.88 %) of plant spray with GA_3 @ 150 ppm and minimum (0.51%) spray with Cycocel @150 ppm were recorded as compare to control (0.46%) respectively. The higher andrographolide content in leaf applied with GA_3 @ 100 ppm (2.97 % w/w) , treated with GA_3 @ 200 ppm (2.66 % w/w), treated with Cycocel @ 100 ppm (2.64 % w/w) and NAA @ 100 ppm (2.58 w/w) was registered as compare to control (1.72 % w/w) respectively. Similar results have been registered by Menaria and Maliwal (2006) in *fennel.*

Table 1: The Impact of Plant Growth Hormones on Yield & Biochemical constitute in Kalmegh (*Andrographis peniculata* Burn F. Ex) at maturity

Treatments	Number of seed / pods	No. of pods /plant	1000 Seed weight (g)	Pod weight (g/plant)	Seed yield (g/plant)	Seed yield (Kg/ha)	Herbage yield (g/plant)	Herbage yield (Q/ha)	Nitrogen %	Protein %	Fat %	Fiber %	Ash %	* Leaf Alkaloid content (% w/w)
Cycocel @100 ppm	9.66	112.76	2.47	2.77	53.98	513.47	30.06	180.24	0.61	3.52	1.71	1.12	0.67	2.64
Cycocel @150 ppm	10.22	115.63	2.36	2.64	57.49	417.84	29.48	163.19	0.69	3.93	1.42	0.59	0.51	2.40
Cycocel @200 ppm	8.11	114.51	2.22	2.39	58.95	416.29	27.78	162.03	0.74	3.61	1.23	0.68	0.61	1.89
GA_3 @100 ppm	8.88	120.86	2.66	2.63	53.11	531.17	31.51	193.23	0.77	4.36	1.59	0.96	0.78	2.97
GA_3@ 150 ppm	8.44	114.93	2.88	3.00	49.59	475.33	39.60	165.16	0.70	4.20	1.48	0.93	0.88	2.48
GA_3 @200 ppm	8.88	118.71	2.31	3.50	52.49	394.18	28.71	162.15	0.64	3.55	1.18	0.72	0.60	2.66
NAA @100 ppm	8.22	116.30	2.42	2.73	58.31	482.59	38.53	168.52	0.72	3.98	1.05	0.73	0.74	2.58
NAA @150 ppm	9.11	114.92	2.34	2.71	53.60	477.12	36.08	166.74	0.68	3.60	0.91	0.71	0.66	2.40
Control	7.88	107.44	2.13	1.99	42.43	382.35	22.55	159.30	0.58	3.32	0.77	0.54	0.46	1.72
SE (m) ±	0.57	5.39	0.38	0.13	1.93	14.12	2.53	5.21	0.11	0.68	0.37	0.16	0.15	-
C D at 5%	1.76	NS	1.16	0.41	5.94	32.02	7.81	16.10	0.35	2.11	1.15	0.50	NS	-

* The replicated pooled samples of leaf were used for estimation of alkaloid and hence, could not be analyzed statistically and only mean values have been presented.

CONCLUSION

The leaf and the whole herb contain the medicinal important. The fresh and dried leaves of Kalmegh are used as drugs in India. Significantly higher Seed yield (531.17 Kg/ha) and herbage yield (193.23 Q/ha) was observed by treatment GA_3 @100 ppm at harvesting time as compare to treatment GA_3 @ 200 ppm (394.18 Kg/ha) and Cycocel @ 200 ppm (162.03 Q/ha) respectively. The leaves of the herb was found to contain the highest amount of Andrographolide. The final test, however is that harvested yields must be increase or medicinal quality enhanced in order for growth hormones to be profitable.

Acknowledgments

We are thankful to the Department of Plant Physiology, College of Agriculture, Jabalpur (JNKVV) and IISS, Bhopal for providing lab facilities for the analysis. And with thanks for the research farm RAK College of Agriculture, Sehore (Madhya Pradesh) for conducted of experiments.

REFERENCES

A.O.A.C. (1980). Official Method of Analysis Association of Official Chemists. Washington, D.C.USA.

A.O.A.C (1985). Nitrogen (5) Micro-Kjeldahl method official, final action. In : HorwitzW (Ed) Official method of analysis of the Association of Official Agricultural Chemist. A.O.A.C. Publication Washington D.C., p.p. 744-745.

Chennakesava, B.C., Ramaprasanna, K.P., & Ramachandrappa, B.K. (Digest. 2007-2010). Effect of plant growth regulators and micronutrients on growth components and seed yield in African tall fodder maize (*Zea mays* L.). *Agric. Sci. 27*, 38-40.

Gorter, M. K. (1911). The bitter constituent of *Andrographis peniculata* Nees *Res. Trav. Chem. 30*, 151-160.

Menaria, B.L., & Maliwal P.L. (2006). Effect of plant density, level of fertilizer and growth regulators on yield attributes and yield of transplanted fennel (*Foeniculum vulgare* Mill.). *Ind. J. Agri. Sci., 76*(4), 235-237

Panse, V.G., & Sukhatme, P.V. (1989). Statical methods for Agriculture workers. *ICAR New Delhi*, pp. 97-105.

Prathanturarug, S. (2007). Variation in growth & diterpene, lactone among field–cultivation *Andrographis paniculata*. J.C.L. 9856A, *61*(2), 59-163.

Sowmya K., & Umesha K. (2018). Influence of plant growth regulators on yield and economics of cultivation of Kalmegh (*Andrographis paniculata* Nees.) *International Journal of Chemical Studies 6*(6), 1317-1319.